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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. 35.C14845

First Named Inventor or Application Identifier

ATSUSHI KAKIMOTO

Express Mail Label No.

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO:

Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☐ Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)

2. ☐ Applicant claims small entity status.
See 37 CFR 1.27.

3. ☒ Specification Total Pages

4. ☒ Drawing(s) (35 USC 113) Total Sheets

5. ☐ Oath or Declaration Total Pages

a. ☐ Newly executed (original or copy)

b. ☐ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 6 below]

i. ☐ DELETION OF INVENTOR(S)
Signed Statement attached deleting inventor(s)
named in the prior application, see 37 CFR
1.63(d)(2) and 1.33(b).

6. ☒ Application Data Sheet. See 37 CFR 1.76

7. ☐ CD-ROM or CD-R in duplicate, large table or Computer
Program (Appendix)

8. ☐ Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)

a. ☐ Computer Readable Form (CRF)

b. Specification Sequence Listing on:

i. ☐ CD-ROM or CD-R (2 copies); or

ii. ☐ paper

c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☐ Assignment Papers (cover sheet & document(s))

10. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney
(when there is an assignee)

11. ☐ English Translation Document (if applicable)

12. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS
Citations

13. ☐ Preliminary Amendment

14. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)

15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)

16. ☐ Other: _____

17. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. ____/_____
Prior application information: Examiner _____ Group/Art Unit: _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

18. CORRESPONDENCE ADDRESS

☒ Customer Number or Bar Code Label (Insert Customer No. or Attach bar code label here) or ☐ Correspondence address below

NAME

Address

City

State

Zip Code

Country

Telephone

Fax



CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
	TOTAL CLAIMS (37 CFR 1.16(c))	24-20 =	4	X \$ 18.00 =	\$72.00
	INDEPENDENT CLAIMS (37 CFR 1.16(b))	3-3 =	0	X \$ 80.00 =	\$ 0.00
	MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1.16(d))			\$260.00 =	\$ 0.00
				BASIC FEE (37 CFR 1.16(a))	\$710.00
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	Reduction by 50% for filing by small entity (Note 37 CFR 1.9, 1.27, 1.28).				
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19. Small entity status

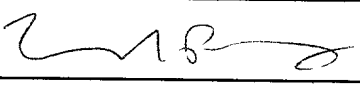
- a. ☐ A small entity statement is enclosed
- b. ☐ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
- c. ☐ Is no longer claimed.

20. ☒ A check in the amount of \$ 782.00 to cover the filing fee is enclosed.

21. ☐ A check in the amount of \$ _____ to cover the recordal fee is enclosed.

22. The Commissioner is hereby authorized to credit overpayments or charge the following fees to Deposit Account No. 06-1205:

- a. ☒ Fees required under 37 CFR 1.16.
- b. ☒ Fees required under 37 CFR 1.17.
- c. ☐ Fees required under 37 CFR 1.18.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED	
NAME	Leonard P. Diana (Reg. No. 29,296)
SIGNATURE	
DATE	October 3, 2000

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Title Line Two:: SYSTEM

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PRIOR FOREIGN APPLICATIONS

Foreign Application One:: 11-283096
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Priority Claimed:: Yes
Foreign Application Two:: 11-238097
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Country:: Japan
Priority Claimed:: Yes
Foreign Application Three:: 2000-303114
Filing Date:: 10-03-00
Country:: Japan
Priority Claimed:: Yes

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INFORMATION MANAGEMENT METHOD
IN NETWORK SYSTEM

BACKGROUND OF THE INVENTION

5 Field of the Invention

The present invention relates to management technology for a network device, particularly a network input/output device such as a printer, a scanner or a facsimile locally connected to an information processing apparatus such as a computer or the like.

Related Background Art

For example in a network system in which plural terminal or host apparatus such as a personal computer (hereinafter also represented as PC) are so connected as to be capable of mutual communication, there is known a system allowing to use various devices (hereinafter also called resources) for example a printer, an image input device such as a scanner or a disk driver locally connected to a terminal apparatus from other terminal apparatus through the network.

In such conventional network system, however, it has not been possible to manage the resources (commonly shared devices) usable by other terminal apparatus through the network and to efficiently check the status of each resource. More specifically it has not been possible to confirm the status of a commonly

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shared device desired on the network by designating such device. Also it has not been possible to automatically acquire the latest status information of the commonly shared device on the network.

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SUMMARY OF THE INVENTION

In consideration of the foregoing, the object of the present invention is to provide an information processing method for use in a network system enabling unified efficient management of the commonly shared devices on the network constantly by latest status information, and an information processing apparatus for executing such method.

The above-mentioned object can be attained, according to the present invention, by an information processing apparatus for use in a network system including plural information processing apparatus connected to a commonly shared device which is usable from another apparatus through the network, the information processing apparatus being featured in the following manner. The information of a shared device present in the above-mentioned network system is managed by management means, and the information of the shared device in the management means is renewed according to the received information of the shared device connected to another information processing apparatus. Also the information processing apparatus

transmits the information of the shared device,
connected to the own host apparatus, to other
apparatus on the network system.

5 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the
configuration of a network system embodying the
present invention;

Fig. 2 is a block diagram showing the
10 configuration of a host terminal apparatus on the
network system;

Fig. 3 is a view showing the module
configuration, in the above-mentioned network system,
between the server function of a host terminal
15 apparatus serving as a server side and the client
function of a host terminal apparatus serving as a
client side;

Fig. 4 is a view showing the module configuration
of the above-mentioned server function and client
20 function within a same host terminal apparatus;

Fig. 5 is a view showing local management
information of the above-mentioned host terminal
apparatus;

Fig. 6 is a view showing resource information of
25 the above-mentioned local management information;

Fig. 7 is a view showing management information
of all the shared devices in the network system;

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Fig. 17 is a flow chart of a start-up process of the host terminal apparatus in a third embodiment; and

Fig. 18 is a flow chart of a start-up process of the host terminal apparatus in a fourth embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 Now the present invention will be clarified in detail by preferred embodiments thereof, with reference to the accompanying drawings.

[First embodiment]

10 The present invention is applicable for example to a network system 100 as shown in Fig. 1. The network system 100 is composed, as shown in Fig. 1, of plural terminal apparatus (host apparatus) 110₁, 110₂, 110₃, 120 which are so connected as to be capable of mutual communication through the network 130. The
15 number of the host terminal apparatus is not limited to four but can be arbitrarily selected.

20 The host terminal apparatus 110₁, 110₂, 110₃ are constructed similarly, and each apparatus is provided with a network server function 111 and a network client function 112. With the network server function 111 there are connected various resources 113₁ to 113_N such as a printer, an image input device, a disk drive etc. The resource means a device connected locally to the host terminal apparatus.

25 The host terminal apparatus 120 is provided with a management (administration) function 121 in the network 130 and a network client function 122. The

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management function 121 is provided with a function similar to the network server function 111 and a management function for each host terminal apparatus, and the network client function 122 is similar to the network client function 112. It is to be noted that the host terminal apparatus 120 having the management function 121 is not essential but may be constructed similar to the host terminal apparatus 110₁, 110₂, 110₃.

In the network system 100 of the present embodiment, as explained in the foregoing, each of the host terminal apparatus 110₁, 110₂, 110₃ is provided with both of the network server function 111 (server module) and the network client function 112 (client module), and these functions are exhibited similarly regardless whether these functions are present in different host terminal apparatus on the network 130 or in a same host terminal apparatus. In the following there will be given a detailed explanation on the network system 100 of the present embodiment. [Internal configuration of the host terminal apparatus 110₁, 110₂, 110₃, 120]

The host terminal apparatus 110₁, 110₂, 110₃, 120 are constructed with a similar internal configuration. In the following, for the purpose of simplicity, there will be explained the configuration of the host terminal apparatus 110₁ as a representative example,

and the other host terminal apparatus 110₂, 110₃, 120 will not be explained further as they are similar in the configuration to the host terminal apparatus 110.

5 The host terminal apparatus 110₁ is capable of disclosing the information of the device (resource) locally connected thereto, and is provided, for example as shown in Fig. 2, with a CPU (central processing unit) 2 for controlling the functions of the entire apparatus, a program memory (PMEM) 3 for
10 storing various programs and data for the operation control in the CPU 2, a communication control unit 4 for controlling the communication with other apparatus on the network 130, an external memory control unit 8 for controlling the data memory function in a floppy disk (FD) 9 or a hard disk (HD) 10 constituting a
15 memory medium for data files, an input control unit 11 for controlling the input operation from a keyboard 12 or a mouse 13 constituting an operation unit, a video image memory (VRAM) 14 for storing display data for a CRT 16 constituting a display device, a display output control unit 15 for controlling the display operation of the CRT 16, a printer control unit 17 for
20 controlling the printout operation of a printer 18, an image input device control unit 1A for controlling the image input operation of an image input device 1B, and
25 an external device control unit 19 for controlling the printer control unit 17 and the image input device

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The PMEM 3 stores control programs for executing various operations including those featuring the present embodiment as will be explained later. More specifically, such control programs are stored in advance in the HD 10, and the CPU 2 suitably selects and reads such programs from the HD 10, develops them on the PMEM 3 and executes them. Thus there can be realized various operations featuring the present embodiment.

The communication control unit 4 controls the input/output data in a communication port 5. Thus the data outputted from the communication port 5 are transmitted, through a communication line 6, to the communication of another apparatus on the network 130.

25 In the foregoing, the network communication with
other apparatus on the network 130 is executed by the
communication control unit 4, communication port 5 and

The input control unit 11 transmits the operation
5 information (system operation command etc.) entered by
the user through the keyboard 12 and the mouse 13 to
the CPU 2.

In the VRAM 14, data to be displayed on the CRT 16 by the control of the display output control unit 15 are developed as bit map data.

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[Module configuration of network server function
 111 and network client function 112]
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As explained in the foregoing, each of the host terminal apparatus 110₁, 110₂, 110₃, 120 is provided with the network server function 111 and the network client function 112 (cf. Fig. 1). Also the network server function 111 and the network client function 112 are so constructed as to function in the same manner regardless whether they are present in different host terminal apparatus on the network 130 or in a same host terminal apparatus.

Fig. 3 shows the relationship between the modules constituting the network server function 111 and the network client function 112 in case the network client function 112 of an arbitrary one of the host terminal apparatus 110₁, 110₂, 110₃, 120 (host terminal apparatus at the client side, hereinafter called "client side host terminal apparatus A") uses the shared device connected to a host terminal apparatus B through the network 130, utilizing the network server function 111 of another host terminal apparatus (host terminal apparatus at the server side, hereinafter called "server side host terminal apparatus B").

The network client function 112 is a function for exchanging desired data with other apparatus through the network 130, and is composed, as shown in Fig. 3, of a module group including a client message manager 21, a client expansion function manager 22, a client expansion function addition/deletion management module

The client message manager 21 executes a process
5 of transmitting a request message, generated by the
client expansion function modules 31₁ to 31_N, 41, to
the network 130 (either transmission to a specified
host terminal apparatus or broadcasting to the entire
network 130). Also the client message manager 21
10 receives a message from another host terminal
apparatus, judges whether or not to process the
message, and, in case the message is identified to be
processed, asks a process for such message to an
appropriate one of the client expansion function
15 modulates 31₁ to 31_N, 41.

The client expansion manager 22 receives information obtained by the network client function 112, and asks, through a general interface, a process corresponding to such information to the client expansion function modules 31₁ to 31_N, 41.

On the other hand, the network server function 111 is a function for receiving request information from a desired client on the network 130 (client side host terminal apparatus A in this case), and is composed, as shown in Fig. 3, of a module group including a server message manager 51, a server expansion function manager 52, a server expansion

function addition/deletion management module 53, and
resource management modules 61_1 to 61_N . In Fig. 3, an
entire network information management module 71 and a
license information management module 72 will be
5 explained later.

The resource management modules 61_1 to 61_N are
modules (server expansion modules) for acquiring
information of the plural resources locally connected
to the own host apparatus (server side host terminal
10 apparatus B) and controlling these resources for
rendering them usable. For example, the resource
management module 61 acquires information of the
locally connected plural resources 80_1 to 80_N and
controls these resources thereby rendering them
15 usable.

The server message manager 51 executes a process
of transmitting an information message, generated by
the resource management modules 61_1 to 61_N (server
expansion modules) to the network 130 (either
20 transmission to a specified host terminal apparatus or
broadcasting to the entire network 130). Also the
server message manager 51 receives a message from
another host terminal apparatus, judges whether or not
to process the message, and, in case the message is
25 identified to be processed, asks a process for such
message to an appropriate one of the resource
management modules 61_1 to 61_N (server expansion

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module).

The server expansion manager 52 receives information obtained by the network server function 111, and asks, through a general interface, a process
5 corresponding to such information to the resource management modules 61_1 to 61_N (server expansion module).

The server expansion function addition/deletion module 53 executes addition or deletion of the
10 resource management modules 61_1 to 61_N (server expansion function modules) in cooperation with the server expansion function manager 52.

The entire network information management module 71 and the license management module 72 shown in Fig.
15 3 are modules (server expansion functions) present only in the management server 120 (host terminal apparatus having the management function). More specifically, the management server 120 has a configuration similar to the host terminal apparatus
20 110_1 , 110_2 , 110_3 (having the network server function 111 and the network client function 112), but is additionally provided with the entire network information management module 71 and the license management module 72.

25 The entire network information management module 71 is used for managing the shared device information (information of all the shared devices connected to

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the respective host terminal apparatus) of all the host terminal apparatus logging on to the management server 120.

5 The license management module 72 executes information exchange, in case a host terminal apparatus having the network client function 112 executes logging on to the management server 120 in order to utilize various services on the network 130, for confirming whether such logging is entitled.

10 Fig. 4 shows the relationship among the modules constituting the network server function 112 and the network client function 111 within a same host terminal apparatus.

15 As shown in Fig. 4, the network client function 112 and the network server function 111 are so constructed as to be capable of mutual communication through a server/client communication module 81. Based on the presence of the server/client communication module 81 between the network server
20 function 111 and the network client function 112, each module constituting these functions can execute process on the data, without differentiating the data exchange with a module in another host terminal apparatus through the network 130 and the data
25 exchange with a module in the same host terminal apparatus (module within the same local host).

 The server/client communication module 81 is also

provided with a data area 82 for storing information to be shared between the network server function 111 and the network client function 112 within the same host terminal apparatus. In the data area 82, there are set the information, acquired by the network server function 111, of the resource locally connected to the own host apparatus and the information on other resource request modules 31_1 to 31_N constituting the client expansion modules of the network client function 112 can efficiently refer to the resource information in the data area 82, and can provide a request to the desired resource.

[Configuration of local management information of host terminal apparatus]

Fig. 5 shows the configuration of the local management information of the host terminal apparatus 110_1 , 110_2 , 110_3 , 120. The local management information includes information of the own host apparatus and information on the resource managed by the own host apparatus, and is stored in the aforementioned data area 82 shown in Fig. 4. Based on such local management information, the host terminal apparatus 110_1 , 110_2 , 110_3 , 120 generate response data to a request for the information on the own host apparatus, from another host terminal apparatus or from the management server 120.

More specifically, the local management information includes information 201 to 209 as shown in Fig. 5. The information 201 is the number of information items (management information items) constituting the local management information. The information 202 is the network address of the own host apparatus. Other host terminal apparatus issue an access request based on the address information 202. The information 203 is identification information of the currently logged-on user (log-on) user information. The information 204 is security management information, including information for managing the access right to the individual shared device connected to the own terminal apparatus. The information 205 is on the server expansion function (resource management modules 61_1 to 61_N) of the own host apparatus, including information on the server expansion function owned by the own terminal apparatus. The information 206 is resource management information (resource information) under the management of the own terminal apparatus. The details of the resource information 206 will be explained later. The information 207 is on the client expansion function (resource request modules 31_1 to 31_N) of the own terminal apparatus, including information on the client expansion function owned by the own terminal apparatus. The information 208 is license information

issued in case a log-on request is issued to the terminal apparatus having the management function (management server 120) and is accepted (permitted) by the management server 120. The license information 208 is used in the response in case of a request from the management server 120. The information 209 is other management information of the own terminal apparatus.

The aforementioned resource information 206 is managed for each kind of resources, such as printers or scanners. More specifically, as shown in Fig. 6, the resource information 206 for a kind of resources includes information 211 to 222. The information 211 is the number of items of the information managed in the resource information 206. The information 212 indicates the kind of the resources ("printer", "scanner" etc.) managed in the resource information 206. The information 213 is other management information in the resource information 206.

The information 214₁ to 214_N are information on the individual resources, having similar structures. For example the information 214₁ relates to a resource R₁, including information 215 to 222.

The information 215 is the name of the resource R₁. The information 216 indicates a shared name in case the resource R₁ is set as shared on the network 130 (in case the resource R₁ is connected as a shared

Fig. 7 shows an example of the configuration of the information (the entire shared device management

The shared device management information is used for managing the shared devices owned by each host terminal apparatus in the network 130, and is held by a host terminal apparatus having the entire network information management module 71 (management server 120 in the present case) if such host terminal apparatus is present in the network 130. Thus, each host terminal apparatus can acquire, whenever necessary, the information on another host terminal apparatus from the shared device management information held by the above-mentioned host terminal apparatus (management server 120). In case the host terminal apparatus having the entire network information management module 71 (management server 120 in the present case) is absent in the network 130, the shared resource management information is collected and stored in each host terminal apparatus.

The entire shared device management information mentioned above includes, as shown in Fig. 7, information 231 on the number of the host terminal apparatus recognized in the network 130 and
25 corresponding to such host terminal apparatus. The access information 232₁ to 232_N are constructed similarly, and, for example, the access information

232₁ for the host terminal apparatus 110₁ includes information 233 to 237_N.

The information 233 is address information of the host terminal apparatus 110₁ on the network 130. Based on such address information, other host terminal apparatus executes exchange of necessary information. The information 234 is user information currently logged on the host terminal apparatus 110₁. The information 235 is other identification information of the host terminal apparatus 110₁. The identification information 235 includes information indicating the kind of the host terminal apparatus 110₁ and information on the operating system employed in the host terminal apparatus 110₁. The information 236 is the number of shared devices connected to the host terminal apparatus 110₁ (under the management thereof). The information 237₁ to 237_N are individual information (shared device management information) corresponding to the shared devices R₁ to R_N indicated by the information 236. For example, the information 237₁ is the management information of a shared device R₁. Consequently, based on the information 237₁ to 237_N, other host terminal apparatus issue an access request to the desired shared device.

[Configuration of data exchanged between host terminal apparatus]

Fig. 8 shows an example, in case an arbitrary one

(client side host terminal apparatus) of the host terminal apparatus 110₁, 110₂, 110₃, 120 utilizes a shared resource connected to another host terminal apparatus (server side host terminal apparatus) through the network 130, of the configuration of the data exchanged between the client side host terminal apparatus and the server side host terminal apparatus. As shown in Fig. 8, the data include header information 240 containing information 241 to 245, real transmission data 250 containing information 251 to 256, and sender data 260 containing information 261 to 264.

In the header information 240, the information 241 is used for identifying the present data at the receiving side. The information 242 is version information of the present data. The information 243 is attribute information of the present data. The attribute information includes information indicating the kind of the present data, such as enquiry, response, information or request. The information 244 is offset information of the real transmission data 250. More specifically, it is head address information of the information 252 of the real transmission data 250. The information 245 is other management information of the present data.

In the real transmission data 250, the information 251 is network information of an addressee

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apparatus 110₁, 110₂, 110₃ or 120 on the network 130. This window image 270 displays icons and associated character information, based on the shared device management information as shown in Fig. 7.

5 As shown in Fig. 9, the present window image 270 displays an icon 271 indicating the own terminal apparatus and a usable resource group 272 locally connected to the own terminal apparatus. In the resource group 272, devices (resources) such as a
10 scanner and a printer are displayed with appropriate icons assigned according to the attributes thereof. Also within such resources, a resource set as shared on the network 130 (shared resource) is displayed with a mark indicating the shared device, for example a
15 "hand" mark. The resource displayed with such mark can be used from other host terminal apparatus on the network 130.

Each icon in the resource group 272 displays status information of the object shared device. For
20 example, an icon 272a shown in Fig. 9 displays "2", indicating that two jobs are currently present in the shared device (printer etc.) corresponding to the icon 272a.

The present window image 270 also displays an
25 icon 273 indicating a network group, icons 274, 275 indicating the host terminal apparatus present in such network group, and a usable resource group 276 locally

connected to such host terminal apparatus. The icons indicating the resources in the resource group 276 do not display a mark indicating the shared device, such as the above-mentioned "hand" mark, since the host
5 terminal apparatus 274, 275 are assumed to have no shared device, but an icon 276a in the resource group 276 displays "2", indicating that two jobs are currently present in the shared resource (printer etc.) corresponding to the icon 276a, as in the
10 aforementioned icon 272a.

As explained in the foregoing, there is displayed the status information of the shared device, utilizing the server expansion function and the client expansion function in the present embodiment, whereby the user
15 can immediately understand the state of the resources under the management of the host terminal apparatus in the network 130.

[Start-up function of the host terminal
apparatus]

20 Fig. 10 shows a start-up sequence of the host terminal apparatus 110₁, 110₂, 110₃, 120. The operations in this sequence are executed by the license information confirmation module 41.

At first there is detected a terminal apparatus
25 having the management function (management server 120) on the network 130 (step S301), and, based on the result of such detection, there is discriminated

whether the management server 120 is present (step S302). The detection and discrimination of the presence of the management server 120 can be achieved, for example, by broadcasting a message inquiring the presence of the management server 120 (an inquiry message according to the data configuration shown in Fig. 8) on the entire network 130 and discriminating whether a response from the management server 120 (a response message according to the data configuration shown in Fig. 8) is obtained in response to such broadcasting.

If the step S302 identifies that the management server 120 is absent on the network 130, the present sequence cannot be continued and is therefore terminated. If the step S302 identifies the presence of the management server 120 on the network 130, there is requested confirmation of the license for permitting the log-on to the management server 120 (step S303).

In response to the issuance of the request for license confirmation in the step S303, there is discriminated whether the license management module 72 in the management server 120 judges that such request for confirmation is from a request from a proper host terminal apparatus (client side) and that the number of permissible accesses from other host terminal apparatus (server side) still has a vacancy, namely

whether the above-mentioned request for license confirmation is accepted (step S304).

If the step S304 identifies that the above-mentioned request for license confirmation is rejected
5 at the side of the management server 120, the present sequence cannot be continued and is therefore terminated. If the step S304 identifies that the above-mentioned request for license confirmation is accepted by the management server 120, license
10 information in response to the request for license confirmation is received from the management server 120 (step S305) and the sequence starting from a subsequent step S306 is executed.

At first the addition of the own host apparatus
15 is informed by broadcasting to other host terminal apparatus on the network 130 (step S306). Then there is acquired information of the shared device connected to the own host apparatus (step S307). Then the shared device information acquired in the step S307,
20 the access information (network information) of the management server 120, and the license information acquired in the step S305 are set, as the local management information as shown in Fig. 5, in the data area 82 (shared setting information storage area; cf.
25 Fig. 4) provided between the network client function 112 and the network server function 111 (step S308). Then there is discriminated whether a host terminal

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apparatus having the entire network information management module 71 (management server 120 in this case) is present in the network 130, and there is also discriminated whether the information (resource information) set in the shared setting information storage area 82 in the step S308 is given to such host terminal apparatus (management server 120) (step S309).

If the step S309 identifies that the entire network information management module 71 in the network 130 and that the local management information (resource information) in the shared setting information storage area 82 is to be given to a host terminal apparatus (management server 120) having such module, such information is uploaded in the above-mentioned host terminal apparatus (management server 120) (step S310). Thus, the host terminal apparatus (management server 120) having the entire network information management module 71 manages the entire shared device management information as shown in Fig. 7, by means of such module 71. The present sequence is thereafter terminated.

If the step S309 identifies that the entire network information management module 71 is absent in the network 130, the entire shared resource management information as shown in Fig. 7 is retained in the individual host terminal apparatus and the process of

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the step S310 need not be executed, so that the present sequence is immediately terminated.

[Status changing operation for the resource of host terminal apparatus (server side)]

5 Fig. 11 shows a sequence for changing the status of the resource locally connected to the host terminal apparatus 110₁, 110₂, 110₃, 120. This sequence is to change the shared resource management information as shown in Fig. 7 according to a change in the resource
10 information 206 in the local management information as shown in Fig. 5, and is executed by the network server function 111. This sequence is always executed when the host terminal apparatus is in the activated state, and monitors the arrival of a resource status changing
15 message (status change information) from the resource management modules 61₁ to 61_N.

 At first there is realized a stand-by state for receiving status change information (for example information indicating a change in the number of jobs
20 present in a printer resource) from the resource management modules 61₁ to 61_N, indicating a change in the status of the resource connected to the own host apparatus (step S321). The status change information is issued from the resource management modules 61₁ to
25 61_N in case of a status change in at least one of all the resources connected to the own host apparatus. When the status change information is received in the

When the status change information is received from the resource management modules 61₁ to 61_N, initialization is executed on the loop setting for acquiring the status information (step S322).

Then there is discriminated, by comparing the value of the loop counter with the set value N, whether the status confirmation process has been completed for all the resources connected to the own host apparatus (step S323).

If the step S323 identifies that the status confirmation process has been completed, the sequence proceeds to a step S327 to be explained later. If the step S323 identifies that the status confirmation process has not been completed, there is compared the status information of an i-th resource set in the resource information 206 of the local management information and the status information on the i-th resource contained in the status change information received in the step S321 (step S324). Based on the result of comparison in the step S324, there is

If the step S325 identifies that the status of the i-th resource has not been changed, the loop counter is counted up (step S329) and the sequence returns to the step S323 in order to process a next resource. If the step S325 identifies that the status of the i-th resource has been changed, the status information of the i-th resource currently set in the resource information 206 of the local management information is renewed by the status information on the i-th resource contained in the status change information received in the step S321 (step S326). Thereafter the loop counter is counted up (step S329) and the sequence returns to the step S323 in order to process a next resource.

25 If the step S327 identifies broadcasting, the status information changed in the present sequence is broadcast on the network 130 (step S328). Thus, in case the host terminal apparatus having the entire network information management module 71 (management

server 120 in this case) is present in the network
130, the shared device management information (cf.
Fig. 7) held in such host terminal apparatus is
renewed by the above-mentioned change information, as
5 will be explained later in more details. In case the
host terminal apparatus having the entire network
information management module 71 is absent in the
network 130, the shared device management information
(cf. Fig. 7) held in the individual host terminal
10 apparatus is changed according to the change
information. Then the sequence returns to the step
S321 for awaiting the reception of the status change
information from the resource management modules 61₁ to
61_N.

15 If the step S327 identifies absence of
broadcasting, the sequence returns to the step S321 for
awaiting the reception of the status change
information from the resource management modules 61₁ to
61_N. Thus, in this case, the status change information
20 is not informed until a request for acquiring the
change information is received from another host
terminal apparatus.

[Status changing operation for the status
information of host terminal apparatus
25 (client side)]

Fig. 12 shows a sequence in the host terminal
apparatus 110₁, 110₂, 110₃, 120 according to the status

change information informed by the network server function 111 of another host terminal apparatus or the own host apparatus. This sequence is executed by the network client function 112.

5 At first there is entered a stand-by state for awaiting the reception of a broadcast message by the network server function 111 (step S331). When the broadcast message is received in the step S331, there is executed a sequence starting from a next step S332.

10 When a broadcast message is received from the network server function 111, there is confirmed the content of the message (step S332). Based on the confirmation in the step S332, there is discriminated whether the received message is from a partner from
15 which the own host apparatus is to acquire the information (step S333).

 If the step S333 identifies that the message is not from a partner from which the information is to be acquired, the sequence returns to the step S331 to
20 enter the state of awaiting the reception of the broadcast message. If the step S333 identifies that the message is from a partner from which the information is to be acquired, initialization is executed on the loop setting for processing all the
25 client expansion modules 31_1 to 31_N , (step S334). More specifically, the loop counter i is set at "0", and the upper limit set value N of the loop is set at the

number of the client expansion modules 31_1 to 31_N by referring to the client expansion function information etc. of the local management information shown in Fig.

6. Then there is discriminated, by comparing the
5 value of the loop counter i with the set value N , whether the process has been completed for all the client expansion modules 31_1 to 31_N (step S335).

If the step S335 identifies that the process has been completed for all the client expansion modules 31_1
10 to 31_N , the sequence returns to the step S331 for awaiting the reception of the broadcast message. If the step S335 identifies that the process has not been completed for all the client expansion modules 31_1 to 31_N , the message received in the step S331 is
15 transferred to the i -th client expansion module (step S336). The i -th client expansion module receiving the message in the step S336 discriminates whether such message is to be processed by the own module (step S337).

20 If the step S337 identifies that the message is not for processing by the own module, the i -th client expansion module informs the network client function 112 of such fact. Thus the network client function 112 counts up the loop counter (step S341) and the
25 sequence returns to the step S335 for processing a next resource.

If the step S337 identifies that the message is

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for processing by the own module, the i-th client expansion module executes a process according to the message (step S338), and informs the network client function 112 of the result of the process. Thus the network client function 112 causes the shared device management information shown in Fig. 7 to reflect the result of process by the i-th client expansion module (step S339). Thus the result of the above-mentioned process is also reflected on the image on the CRT 16 as shown in Fig. 9, namely on the image according to the shared device management information (step S340). For example, the status information 272a, 276a as shown in Fig. 9 change according to the current resource status. Thereafter the sequence returns to the step S331 for awaiting the reception of a broadcast message.

[Information acquiring operation of designated resource]

Fig. 13 shows a process, in the host terminal apparatus 110₁, 110₂, 110₃, 120, for acquiring the status information of a designated resource. This process is effective in case, in the process shown in Fig. 11, the broadcast execution is set "OFF" in order to suppress the increase in the network traffic by the frequent broadcast issuances on the network 130 (cf. step S327 in Fig. 11), and is executed by the network client function 112.

As an example of the method for the user for designating the shared status, the user of the host terminal apparatus of the client side requests the status information by a manual operation from the

5 group of shared devices satisfying a certain condition, among the shared devices connected to other host terminal apparatus. The user designates a target group satisfying the desired condition, by executing a predetermined operation on the display image shown in

10 Fig. 9. The target group can be a group of shared devices connected in the unit of host terminals contained in a network group (domain etc.), or a group of shared devices connected in a certain specified unit of the host terminals, or a group (printer group

15 etc.) of shared devices of a certain category. For the purpose of simplicity of explanation, it is assumed to designate the desired shared devices in the same network 130, but such method is not restrictive and there may be designated the shared devices in

20 another network.

At first there is discriminated, by request information (status acquisition requesting information entered by the user) from the network client function

112 of another host terminal apparatus or the own host

25 apparatus, whether the target host terminal apparatus is a specified single host terminal apparatus or plural host terminal apparatus (step S351). If the

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Then there is discriminated whether the process has been completed for all the host terminal apparatus indicated by the set value N, by comparing the value of the loop counter and the set value N (step S355).

5 If the step S355 identifies that the process has been completed for all the host terminal apparatus, the sequence proceeds to a step S364 to be explained later.

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10 If the step S355 identifies that the process has not been completed for all the host terminal apparatus, there is acquired access information for the i-th host terminal apparatus (network identification information such as an IP address for accessing to a specified host) from the access
15 information acquired in the step S352 or S353 step (step S356). Then the network address information (cf. Fig. 7) included in the access information acquired in the step S356 is set in the request information which is response information to the issuing source of the
20 above-mentioned status acquisition request information (step S357). Then, there is discriminated whether the target shared resource indicated by the aforementioned status acquisition request information is a specified resource of the i-th host terminal apparatus (step
25 S358).

If the step S358 identifies that the target is a specified resource, the information corresponding to

(branched according to the discrimination of the step S355), the network client function 112, receiving the request information by the process of the step S362, causes such request information to be reflected on the image on the CRT 16 of the own host apparatus (step S364). In this manner the status information (272a, 276a etc.) is displayed on the icon of the desired shared device as shown in Fig. 9.

[Second embodiment]

In a second embodiment, there will be explained a host terminal apparatus capable of dynamically reflecting the status of the shared devices of such host terminal apparatus, in response to a log-on or a log-off of the host terminal apparatus on the network system. In the following there will be principally explained features newly added to the foregoing first embodiment.

[Access operation to a shared device under management by other host terminal apparatus]

Fig. 14 shows the function of the client side host terminal apparatus in case an arbitrary one (client side host terminal apparatus) of the host terminal apparatus 110₁, 110₂, 110₃, 120 uses a shared device connected to another host terminal apparatus (server side host terminal apparatus). The operation in this case are executed by the communication of the network client function 112 of the client side host

information acquired in the step S1422 is confirmed to discriminate whether the own host apparatus (client side host terminal apparatus) has a right of access to the desired shared device of the partner (server side host terminal apparatus) (step S1423).

If the step S1423 identifies the absence of access right, the accessing process is interrupted and the present sequence is terminated. If the step S1423 identifies the presence of access right, there is discriminated whether the own host apparatus (client side host terminal apparatus) has ever made an access to the host terminal apparatus to be accessed (server side host terminal apparatus) (step S1424).

If the step S1424 identifies that the access has been made before, the local management information (cf. Fig. 5) of the own host apparatus (client side host terminal apparatus) is referred to and the log-on information therein is reset as the current log-on information for the host terminal apparatus to be accessed (server side host terminal apparatus) (step S1425). If the step S1424 identifies that the access has not been made before, namely the access for the first time, there is set new log-on information (step S1426). More specifically, the log-on information acquired for example by asking the input of an access password to the currently logged-on user is set as the current log-on information for the host terminal

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apparatus to be accessed (server side host terminal apparatus).

After the process of the step S1425 or S1426, there are generated, together with the log-on information set by such process, request data to the host terminal apparatus to be accessed (server side host terminal apparatus) according to the data configuration shown in Fig. 8 (step S1427). Then the request data generated in the step S1427 are transmitted to the host terminal apparatus to be accessed (server side host terminal apparatus), and response data thereto are received (step S1428). Thereafter the present sequence is terminated. [Renewal operation for shared device management information within the network]

Fig. 15 shows a renewal operation for the shared device management information (cf. Fig. 7) in the network 130. As explained in the foregoing, if a host terminal apparatus having the entire network information management module 71 (management server 120 in this case) is present in the network 130, the shared device management information is held by the entire network information management module 71. If the host terminal apparatus having the entire network information management module 71 is absent in the network 130, the shared device management information is held by the individual host terminal apparatus.

Such renewal process for the shared device management information is constantly executed by the client expansion function addition/deletion management module 23 and the server expansion function

5 addition/deletion management module 53 whenever the host terminal apparatus is in the activated state, constantly monitoring the arrival of a message from other host terminal apparatus on the network 130.

At first there is entered a state awaiting a
10 broadcast message from other host terminal apparatus (step S1431). If the step S1431 receives a message, there is executed a process starting from a next step S1432.

Upon receiving a message from another terminal
15 apparatus, there is confirmed the content of such message (step S1432). Based on the confirmation in the step S1432, there is discriminated whether the received message is from a host terminal apparatus from which the own host apparatus is to acquire the
20 information (step S1433).

If the step S1433 identifies that the received message is from a host terminal apparatus from which information is not be acquired, the sequence returns to the step S1431 for entering again a state awaiting
25 the message from other host terminal apparatus. If the step S1433 identifies that the received message is from a host terminal apparatus from which information

is to be acquired, there is discriminated whether the message is a log-off message (step S1434).

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If the step S1434 identifies a log-off message, the information of the host terminal apparatus which has transmitted such message is deleted from the shared device management information (step S1435). More specifically, in case the shared device management information is held by the individual host terminal apparatus, the information of the host terminal apparatus which has transmitted the log-off message is deleted from the shared device management information in the own host apparatus. In case the shared device management information is held by the entire network information management module 71, a deletion request is made to the host terminal apparatus having the entire network information management module 71 (management server 120 in this case). Thereafter the sequence returns to the step S1431 for entering again a state awaiting the message from other host terminal apparatus.

If the step S1434 identifies that the received message is not a log-off message, there is discriminated whether the message is a log-on message (step S1436). If the step S1436 identifies that the received message is not a log-on message, namely in case of reception of a message other than the log-on or log-off message, there is executed an appropriate

The information acquired in the step S1439 or S1440 is added to (or renews) the shared device management information (step S1441).

[Log-off operation of host terminal apparatus]

5 Fig. 16 shows the log-off operation of the host terminal apparatus 110₁, 110₂, 110₃, 120.

At first there is discriminated whether the own host apparatus is in the course of execution of a process based on a request from another host terminal apparatus (step S1451). If the step S1451 identifies that the process is not in execution, the sequence proceeds to a step S1454, skipping next steps S1452 and S1453.

10

If the step S1451 identifies that the process is in execution, there is informed the interruption of such process to the host terminal apparatus which has requested such process (step S1452).

15

After confirmation that a response permitting the interruption is returned, in response to the informing, from the addressee host terminal apparatus of such informing, the process currently executed is interrupted (step S1453).

20

After the process of the step S1453 or in case the step S1451 identifies that the process is not in execution, namely when the own host apparatus is no longer in the state of process execution, the log-off operation of the own host apparatus is informed by

25

server) on the network. Based on the result of such detection, a step S1702 discriminates whether the management server is present. The detection of the management server and the discrimination of presence thereof can be achieved, for example, by broadcasting a message inquiring the presence of the management server to the entire network and judging the presence of a response thereto.

If the step S1702 identifies that the management server is absent on the network, the process cannot be continued further and is therefore terminated. If the step S1702 identifies the presence of the management server, a step S1703 requests confirmation of the license for log-on permission to the management server.

The confirmation of the license in the step S1704 identifies that such request is from a proper host terminal apparatus and that the number of permissible accesses in the server side still has a vacancy, the sequence branches to a step S1705. If the effective license is judged absent, the sequence cannot be continued further and is therefore terminated.

A step S1705 receives the license information from the management server. A step S1706 acquires the shared device information of the own host apparatus. Then a step S1707 sets the acquired shared device information, the network information for accessing to

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entire shared device information on the network as shown in Fig. 7, based on the information acquired in the step S1711, and sets such entire shared device information in the shared setting information storage area of the server/client modules.

As all the access information setting relating to the network is completed, a step S1713 broadcasts the addition of the own apparatus to other host terminals on the network, in order to inform that the own apparatus is being ready. Thus all the processes are completed.

In the third embodiment, as explained in the foregoing, it is rendered possible to manage the resource (shared device) usable by other terminals through the network even in case the management terminal does not manage the information of the shared device of the individual host terminals, thereby efficiency checking status of the resources.

[Fourth embodiment]

As a fourth embodiment, there will be explained a method of applying the present invention to a network system not containing the management server terminal. In the present embodiment, at the start-up of the host terminal, there is not executed the process of confirming the license to the management server terminal. More specifically, there is given an example of the process in case the function is present

is made within a predetermined time, and, if the response is judged present, the sequence proceeds to a step S1806, but, if the response is judged absent, the start-up process is terminated.

5 A step S1806 requests, to each host terminal giving the response, the shared device information of such host terminal. A step S1807 prepares the entire shared device information on the network as shown in Fig. 7, based on the shared device information of the
10 host terminals on the network, obtained in the step S1806, and additionally sets such entire shared device information to the shared setting information storage area of the server/client modules, whereupon the process is terminated.

15 In the fourth embodiment, as explained in the foregoing, it is rendered possible, even in the network system in which the management terminal is not present, to manage the resource (shared device) usable by other terminal apparatus through the network,
20 thereby efficiently checking the status of the resources.

 The objects of the present invention can naturally be attained also in a case where a memory medium storing the program codes of a software
25 realizing the functions of the host and terminals of the aforementioned embodiments is supplied to a system or an apparatus and the functions of the

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information of the shared devices constantly as the latest information, and to provide the information of the shared device designated from the user, based on such management information. For example, in case the management information of the shared devices is displayed, the user can easily and exactly confirm the status of the current shared devices and can acquire the status of the desired shared device only.

5

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WHAT IS CLAIMED IS:

1. An information processing apparatus for use
in a network system provided with plural information
processing apparatus to which connected is a shared
5 device so functioning as to be usable from other
apparatus through the network, the apparatus
comprising:

management means for managing the information of
a shared device present in said network system;

10 reception means for receiving the information of
a shared device connected to another information
processing apparatus;

transmission means for transmitting the
information of a shared device connected to the own
15 apparatus to apparatus on said network system; and

renewal means for renewing the information of the
shared device in said management means, based on the
information received by said reception means.

20 2. An information processing apparatus according
to claim 1, wherein said reception means includes
first reception control means for designating a group
satisfying a predetermined condition and receiving the
information of the shared device included in said
25 group.

3. An information processing apparatus according

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to claim 1, wherein said reception means includes
second reception control means for detecting log-on of
another information processing apparatus to said
network system and receiving the information of the
5 shared device of said another information processing
apparatus.

4. An information processing apparatus according
to claim 1, wherein said reception means is adapted,
10 at the log-on to said network system, to automatically
receive the information of the shared device present
in said network system.

5. An information processing apparatus according
15 to claim 1, wherein said transmission means is
adapted, in response to the detection of a change in
the status of a shared device connected to the own
apparatus, to transmit information on the status after
said change.

20

6. An information processing apparatus according
to claim 1, wherein said transmission means is
adapted, at the log-on to said network system, to
automatically transmit the information of the shared
25 device connected to the own apparatus.

7. An information processing apparatus according

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to claim 1, wherein said renewal means is adapted, in response to the detection of log-off of another information processing apparatus from said network system, to invalidate the information of the shared
5 device of said another information processing apparatus in said management means.

8. An information processing apparatus according to claim 1, wherein said transmission means is
10 adapted, in informing the information of the shared device connected to the own apparatus to another information processing apparatus, to selectively execute a first method for transmission to a
predetermined management apparatus on said network
15 system or a second method for transmission to another information processing apparatus through said network system.

9. An information processing method for use in a
20 network system provided with plural information processing apparatus to which connected is a shared device so functioning as to be usable from other apparatus through the network, the method comprising:

a management step of managing the information of
25 a shared device present in said network system by management means;

a reception step of receiving the information of

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a shared device connected to another information processing apparatus;

a transmission step of transmitting the information of a shared device connected to the own apparatus to apparatus on said network system; and

a renewal step of renewing the information of the shared device in said management means, based on the information received by said reception step.

10 10. An information processing method according to claim 9, wherein said reception means includes a first reception control step of designating a group satisfying a predetermined condition and receiving the information of the shared device included in said group.

15 11. An information processing method according to claim 9, wherein said reception step includes a second reception control step of detecting log-on of another information processing apparatus to said network system and receiving the information of the shared device of said another information processing apparatus.

25 12. An information processing method according to claim 9, wherein said reception step is adapted, at the log-on to said network system, to automatically

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processing apparatus, to selectively execute a first
method for transmission to a predetermined management
apparatus on said network system or a second method
for transmission to another information processing
5 apparatus through said network system.

17. A computer readable memory which stores a
program to be executed by a computer of an information
processing apparatus for use in a network system
10 provided with plural information processing apparatus
to which connected is a shared device so functioning
as to be usable from other apparatus through the
network, the program comprising:

a management step of managing the information of
15 a shared device present in said network system by
management means;

a reception step of receiving the information of
a shared device connected to another information
processing apparatus;

20 a transmission step of transmitting the
information of a shared device connected to the own
apparatus to apparatus on said network system; and

a renewal step of renewing the information of the
shared device in said management means, based on the
25 information received by said reception step.

18. A computer readable memory according to

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claim 17, wherein said reception means includes a
first reception control step of designating a group
satisfying a predetermined condition and receiving the
information of the shared device included in said
5 group.

19. A computer readable memory according to
claim 17, wherein said reception step includes a
second reception control step of detecting log-on of
10 another information processing apparatus to said
network system and receiving the information of the
shared device of said another information processing
apparatus.

20. A computer readable memory according to
claim 17, wherein said reception step is adapted, at
the log-on to said network system, to automatically
receive the information of the shared device present
in said network system.

21. A computer readable memory according to
claim 17, wherein said transmission step is adapted,
in response to the detection of a change in the status
of a shared device connected to the own apparatus, to
25 transmit information on the status after said change.

22. A computer readable memory according to

claim 17, wherein said transmission step is adapted,
at the log-on to said network system, to automatically
transmit the information of the shared device
connected to the own apparatus.

5

23. A computer readable memory according to
claim 17, wherein said renewal step is adapted, in
response to the detection of log-off of another
information processing apparatus from said network
10 system, to invalidate the information of the shared
device of said another information processing
apparatus in said management means.

24. A computer readable memory according to
15 claim 17, wherein said transmission step is adapted,
in informing the information of the shared device
connected to the own apparatus to another information
processing apparatus, to selectively execute a first
method for transmission to a predetermined management
20 apparatus on said network system or a second method
for transmission to another information processing
apparatus through said network system.

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ABSTRACT OF THE DISCLOSURE

The invention provides a terminal apparatus capable of efficiently managing the status of the shared device on the network in unified manner constantly with the latest status information, thereby easily understanding the status of the desired shared device.

For each of the terminal apparatus on the network, there are provided server means and server means. These means function in the same manner regardless whether the information exchange is with another apparatus or within the own apparatus. The server means acquires and provides the information of the shared device, required from the client means of another apparatus or the own apparatus.

FIG. 1

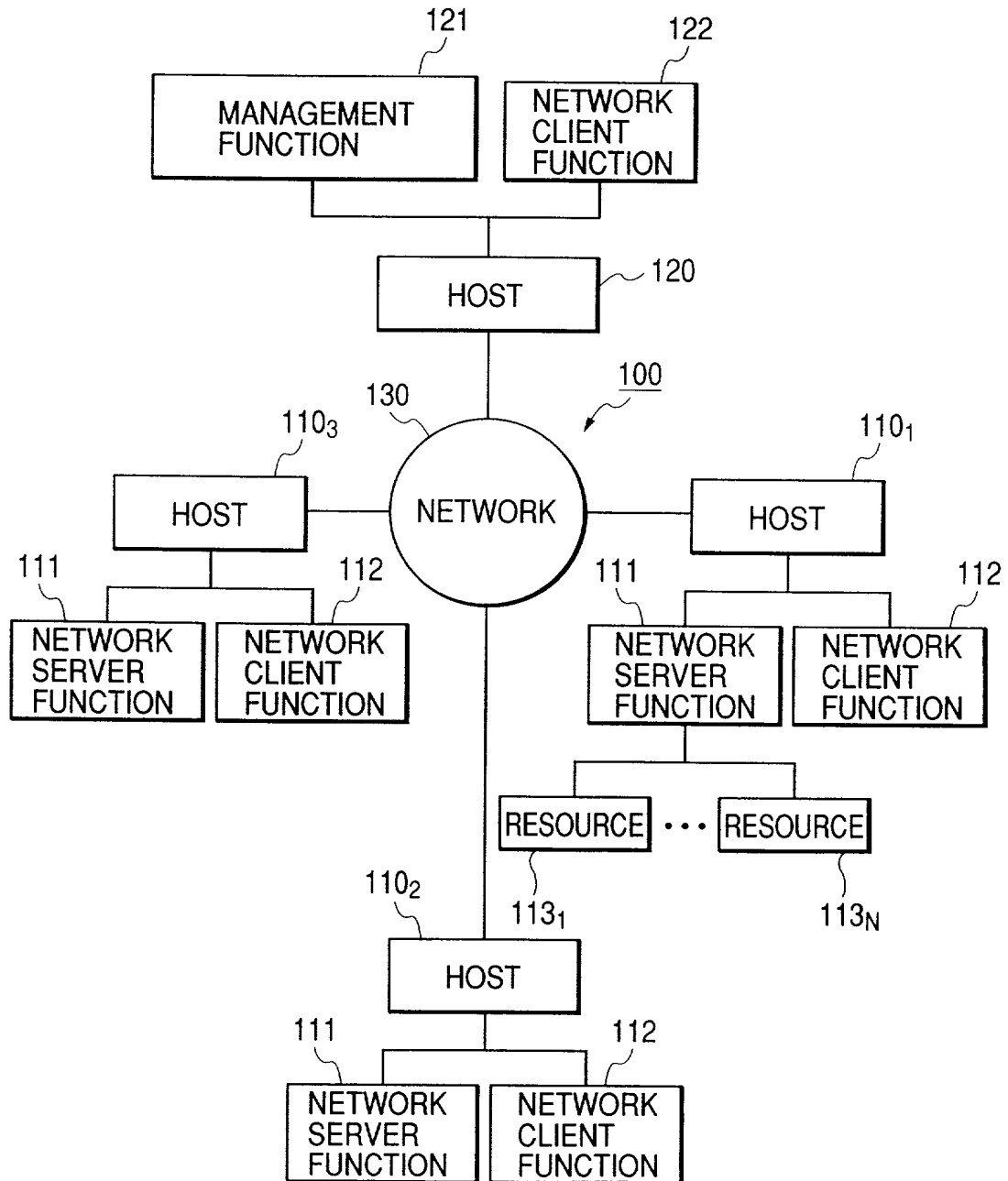
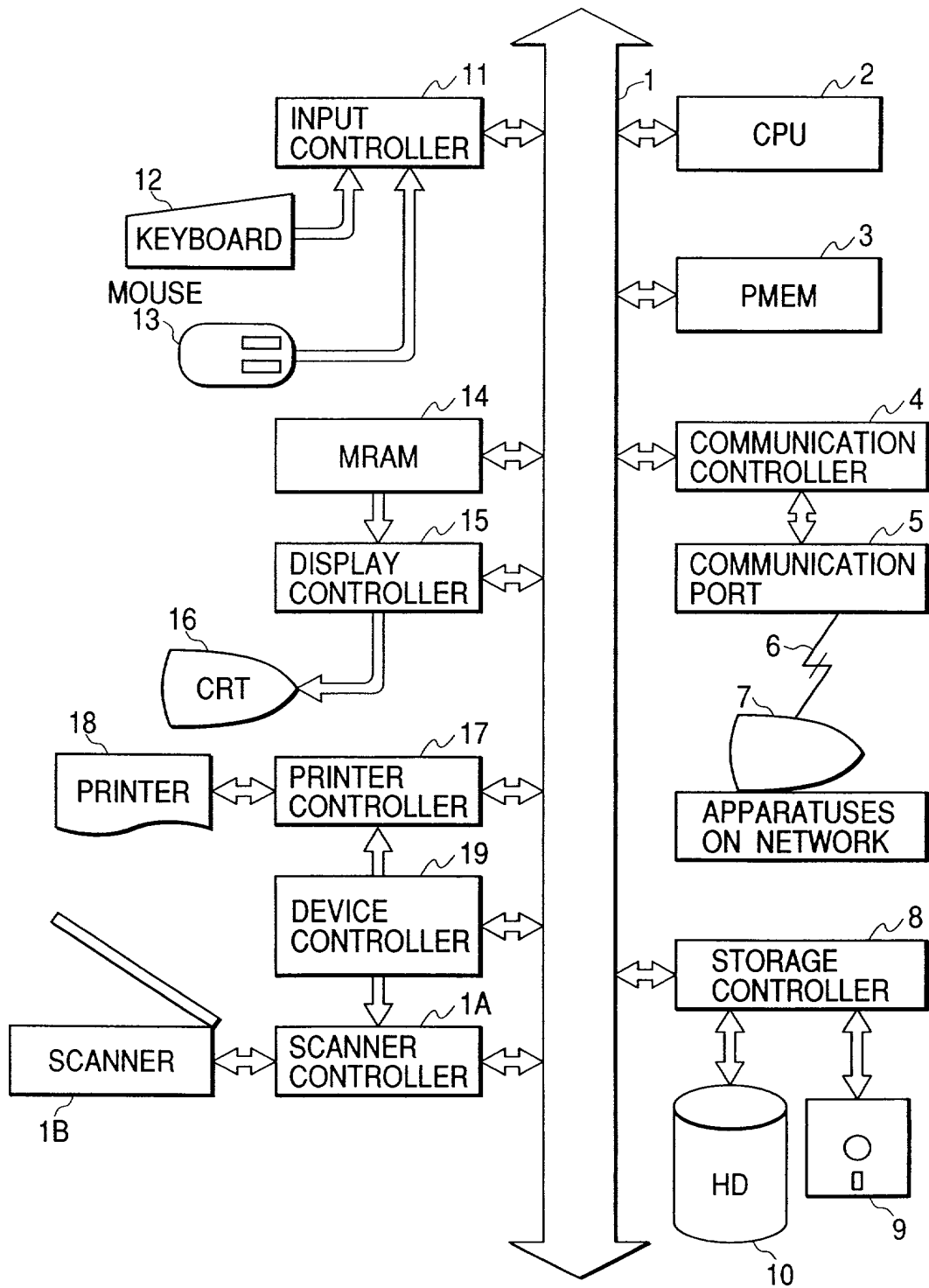


FIG. 2



CLIENT HOST A

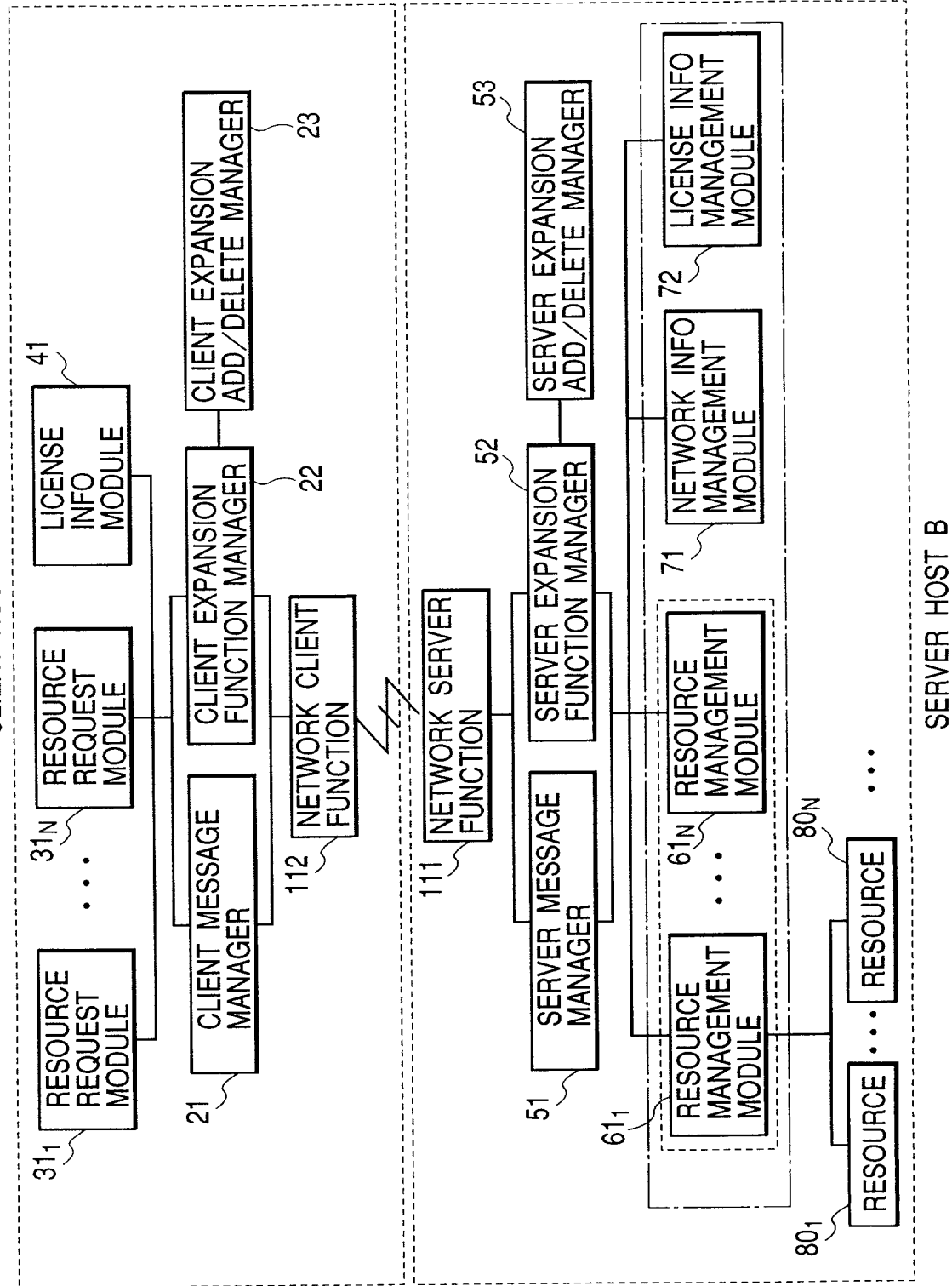


FIG. 4

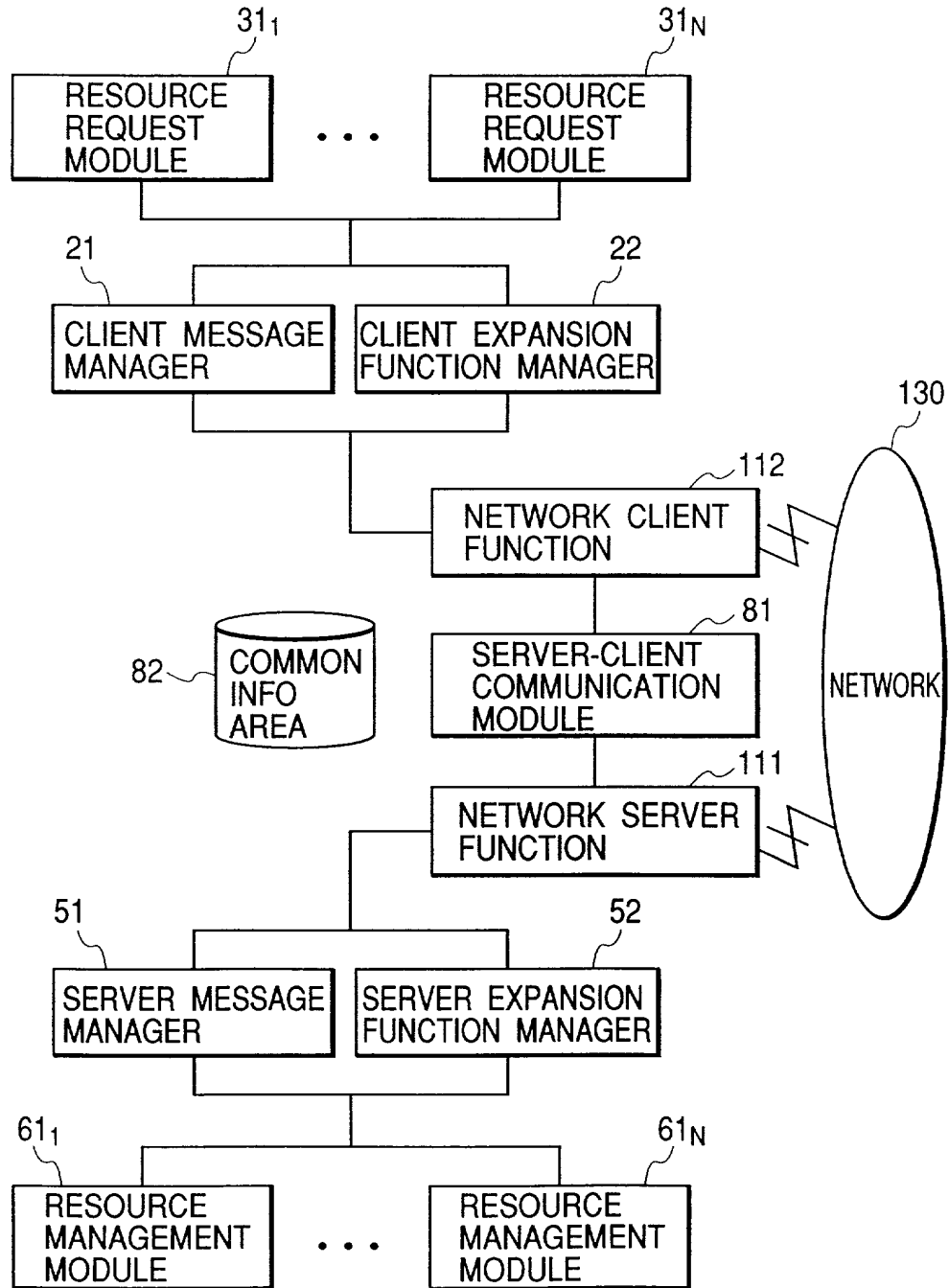


FIG. 6

NO. OF ITEMS		211
RESOURCE TYPE		212
OTHERS		213
214 ₁ { INFO ON RESOURCE R ₁	RESOURCE NAME	215
	NETWORK NAME	216
	SECURITY	217
	DRIVER	218
	COLOR	219
	EXPANSION FUNCTION	220
	STATUS	221
	OTHERS	222
⋮		
INFO ON RESOURCE R _N		214 _N

FIG. 7

NO. OF HOSTS		231
232 ₁ ACCESS TO HOST 110 ₁	NETWORK ADDRESS OF HOST 110 ₁	233
	LOGON USER	234
	OTHERS	235
	NO. OF DEVICES CONNECTED TO HOST 110 ₁	236
	INFO ON RESOURCE R ₁	237 ₁
	⋮	
	INFO ON RESOURCE R _N	237 _N
232 _N	⋮	
	ACCESS TO HOST 110 _N	

FIG. 8

240	HEADER	ID	241
		VERSION	242
		ATTRIBUTE	243
		OFFSET	244
		OTHERS	245
250	TRANSMISSION DATA	NETWORK INFO ON RECEIVER HOST	251
		ID OF SERVER EXPANSION MODULE	252
		FUNCTION REQUESTED	253
		SECURITY	254
		DATA	255
		OTHERS	256
260	SENDER DATA	NETWORK INFO ON SENDER HOST	261
		LOGON USER	262
		TIME OUT	263
		OTHERS	264

FIG. 9

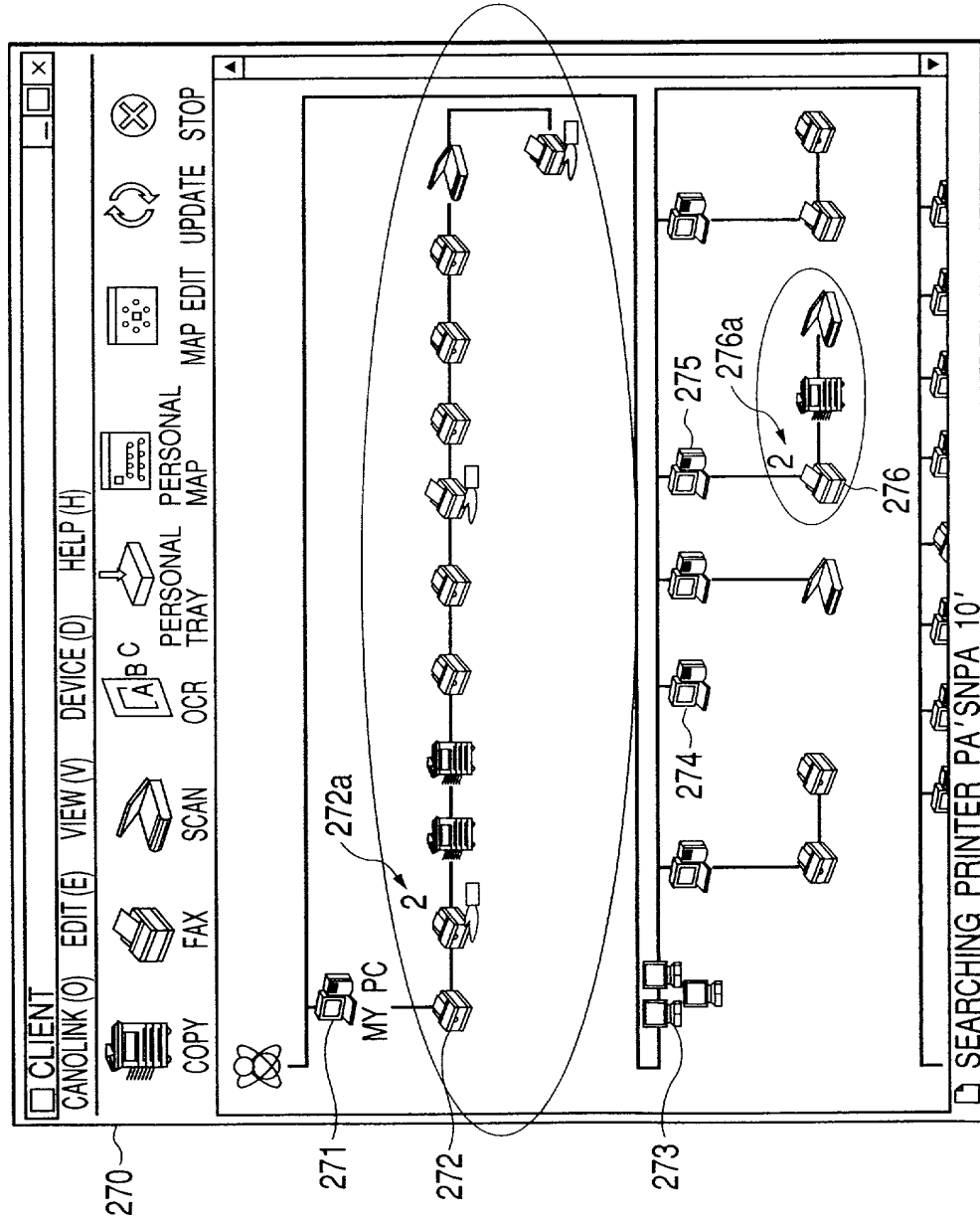


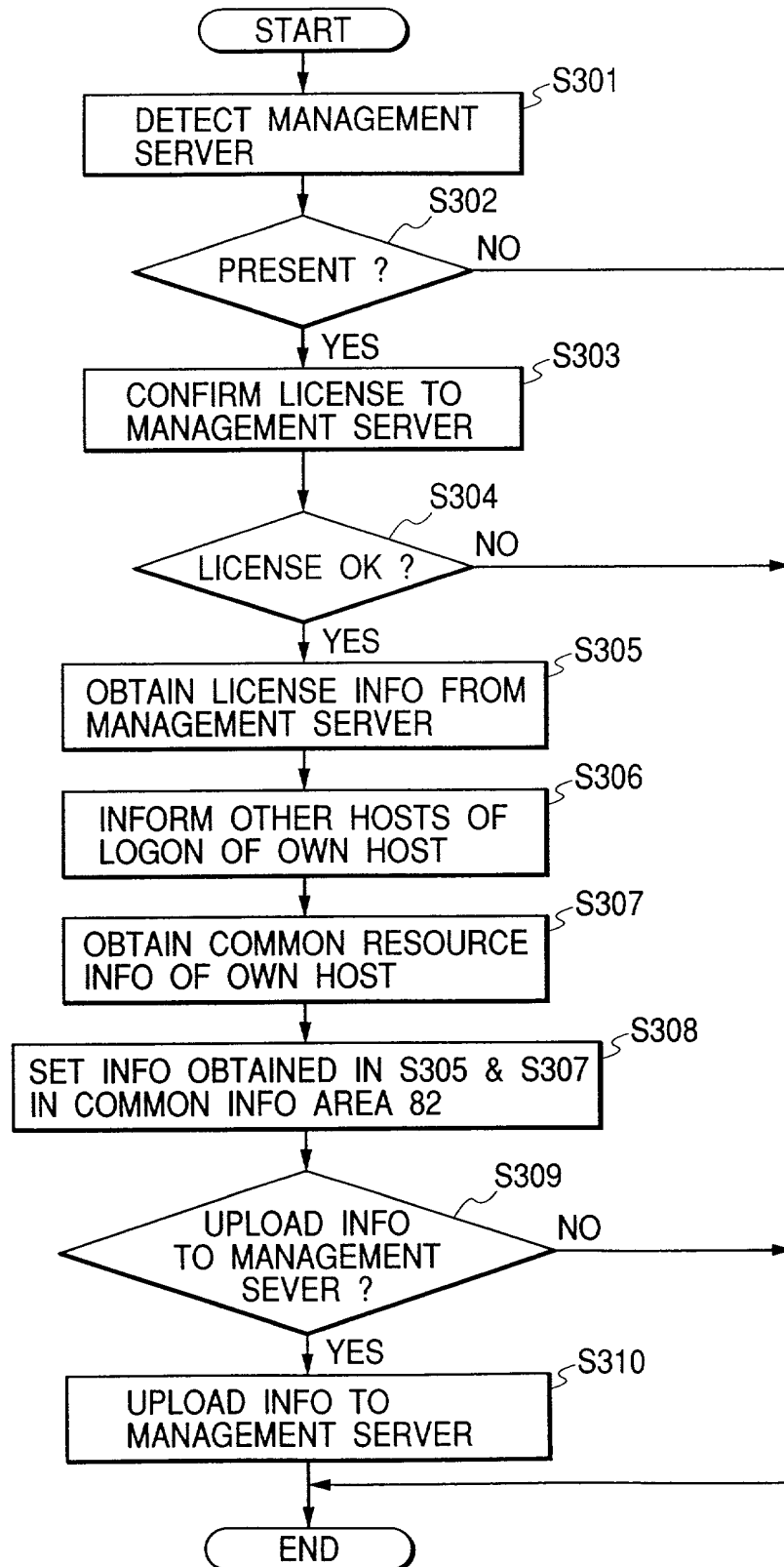
FIG. 10

FIG. 11

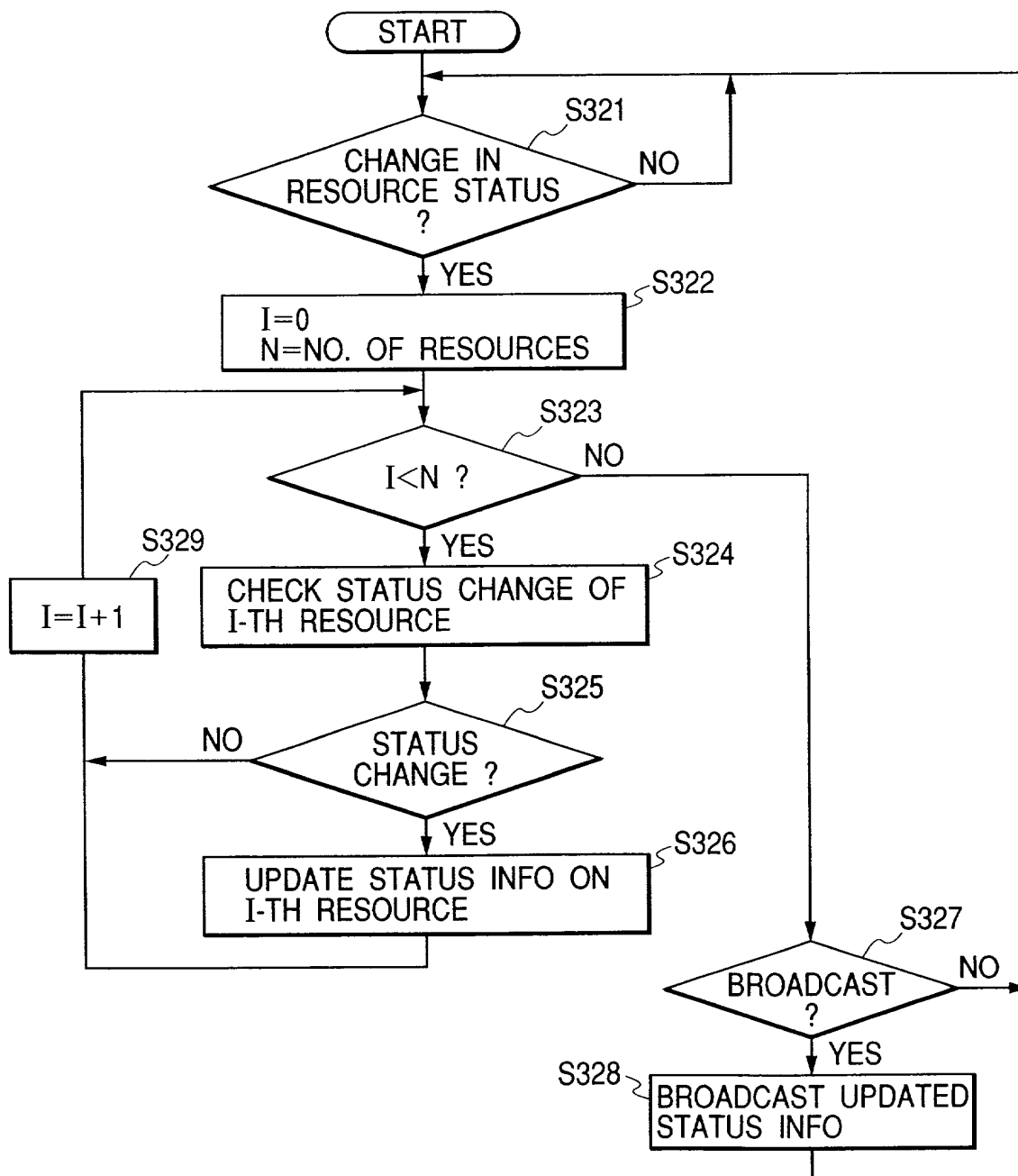


FIG. 12

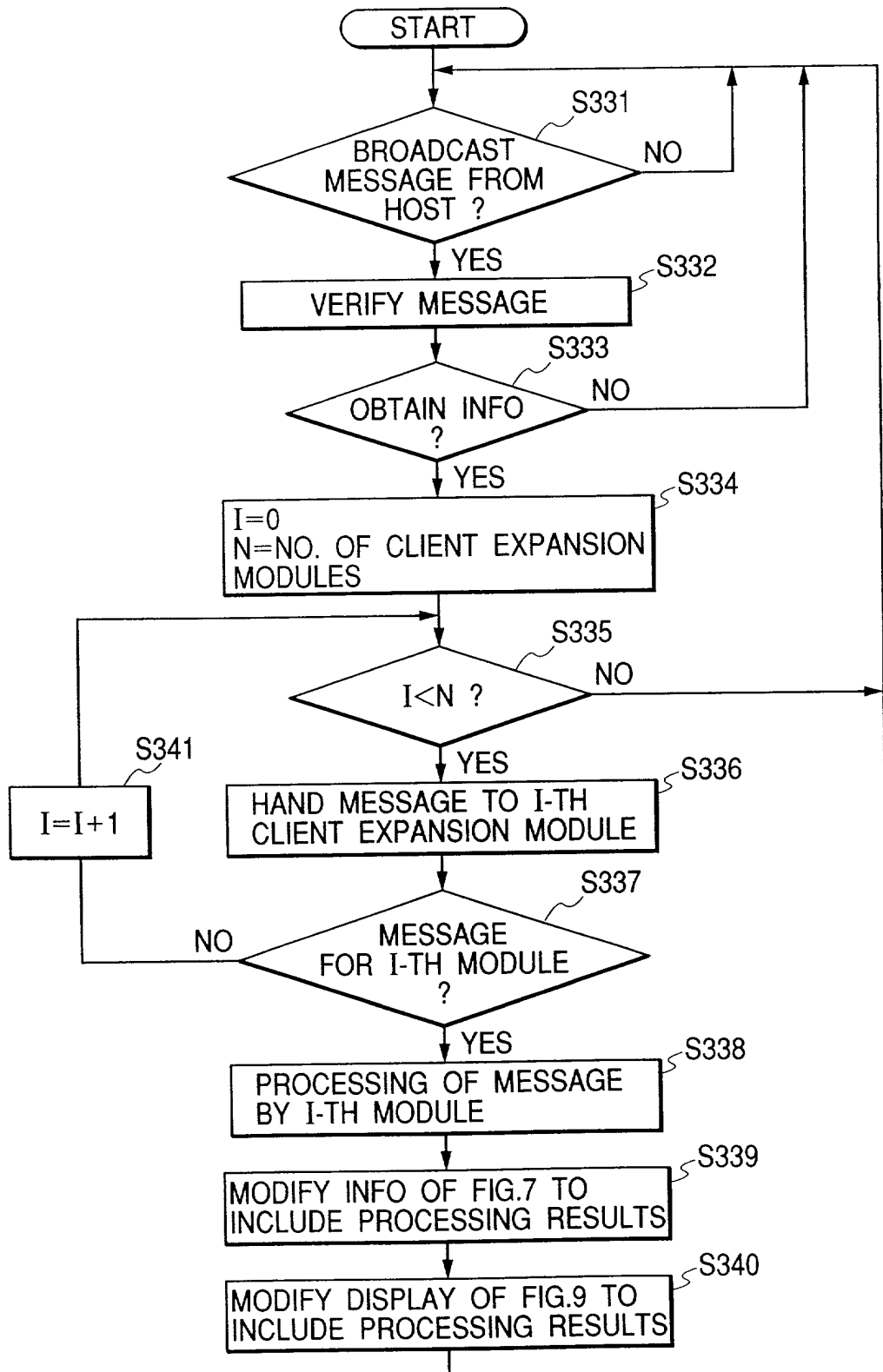


FIG. 13

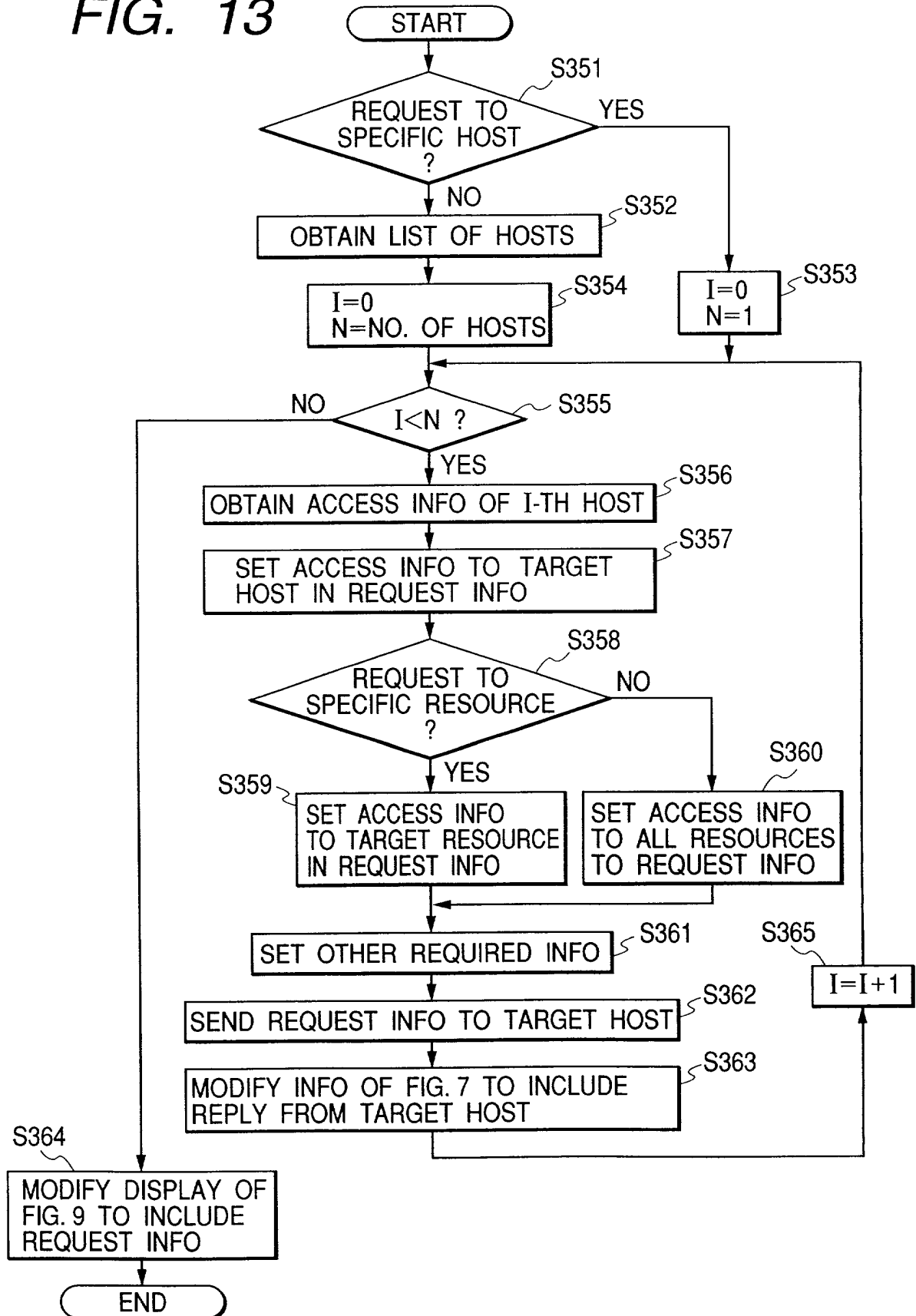


FIG. 14

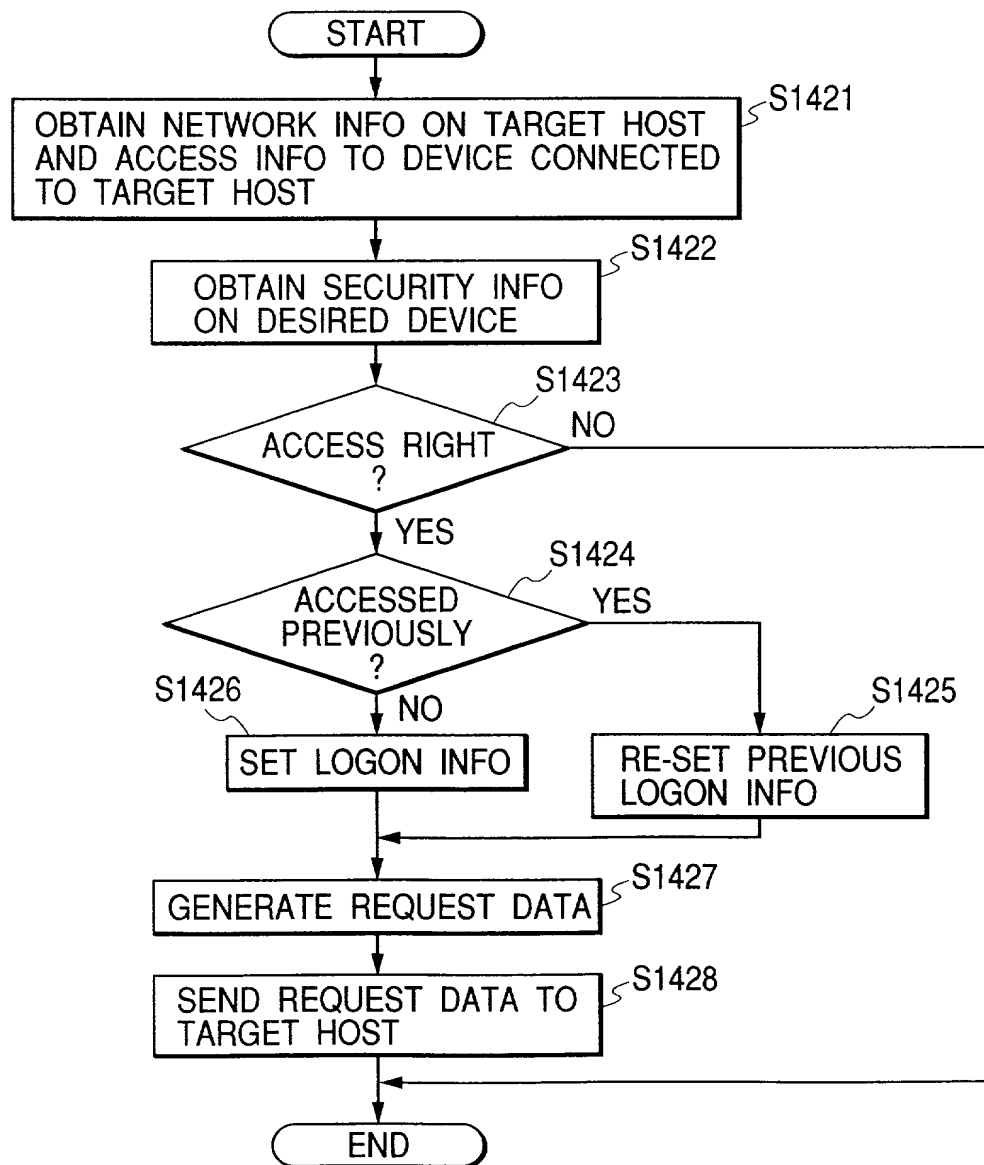


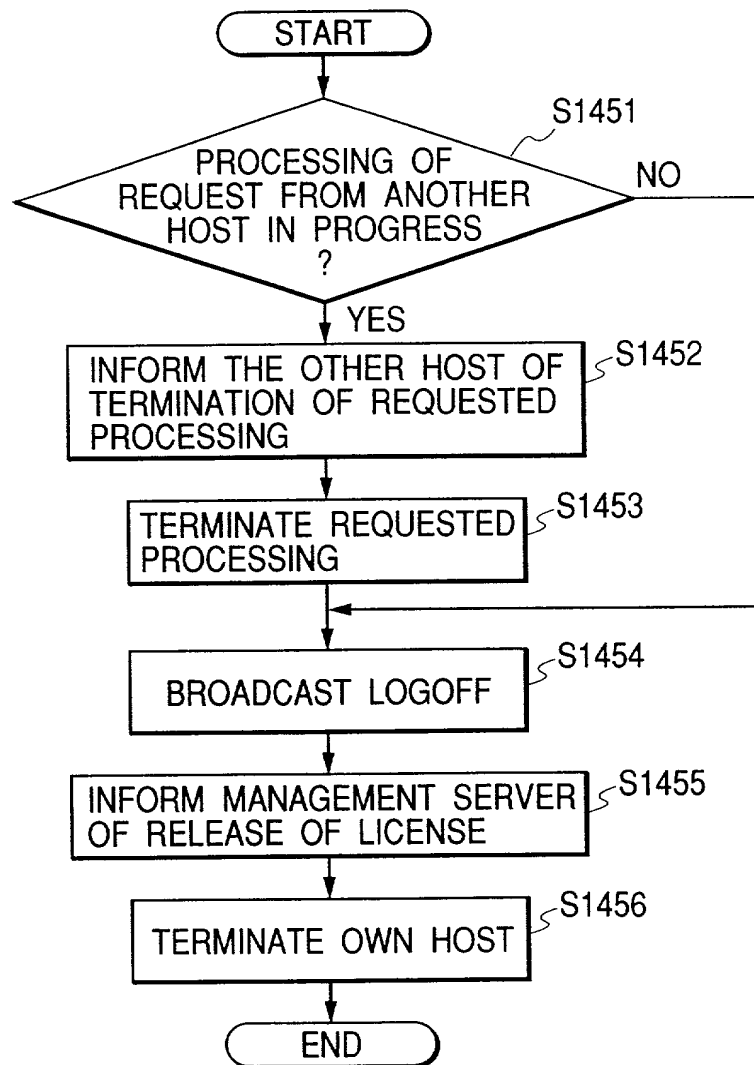
FIG. 16

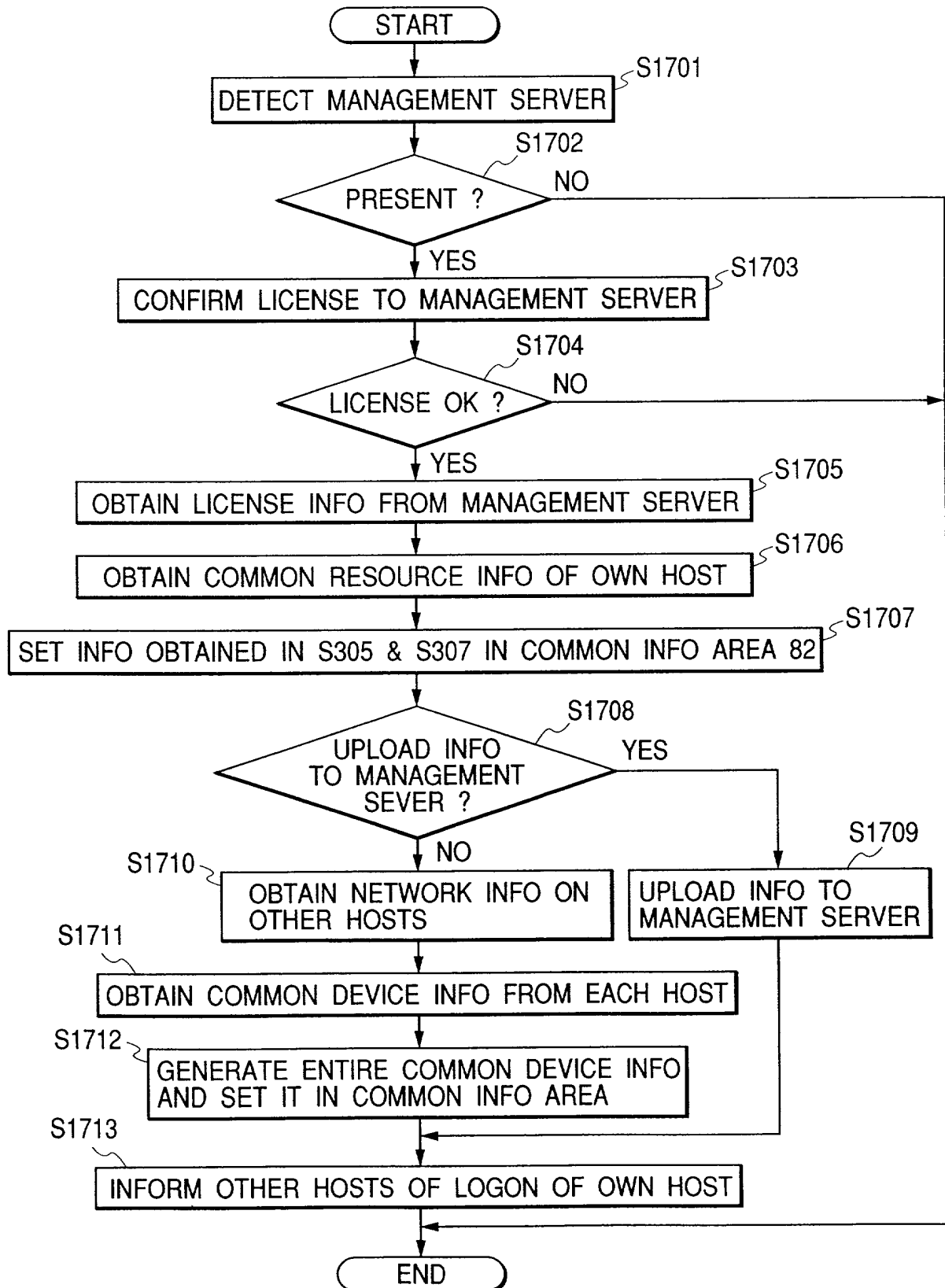
FIG. 17

FIG. 18